# PATENT ABSTRACTS OF JAPAN

(54) TIME ADJUSTING METHOD OF TIMEPIECE
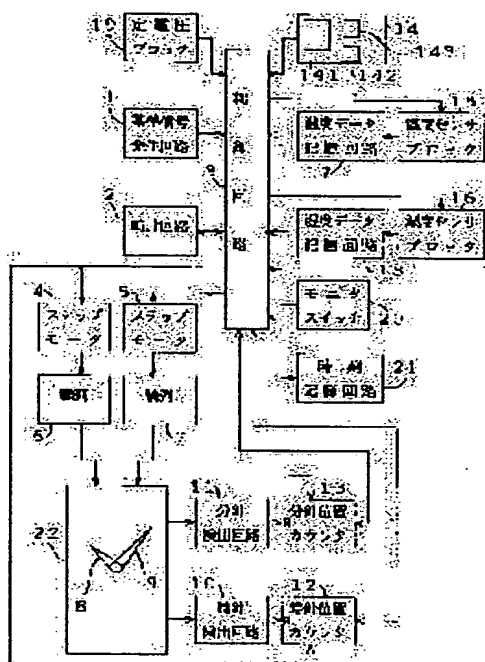
(57)Abstract:

PURPOSE: To provide an analog timepiece which can accurately indicate the present time when the mode is returned to a lock mode even when the mode is wrongly switched to a time adjusting mode by starting time adjustment by operating a time adjusting switch after the mode is switched to the time adjusting mode. CONSTITUTION: When an up-key 142 and down-key 143 are operated while a mode change-over switch 141 designates a set mode, a control circuit 3 stop hands indicating the present time. When the up-key 142 is operated in a 'time set-time mode', the circuit 3 rotates a short hand 8 clockwise by one-hour amount and, when the down-key 143 is operated, rotates a long hand 9 counterclockwise by one-hour amount. In the case where the indicating position of the long hand 9 is not correct minute's position, the circuit 3 moves the hand 9 counterclockwise to the correct minute's position and any fraction sum of seconds is discarded. When the keys 142 and 143 are operated in a 'time set- minute mode', the hand 9 is moved to the position of the present minute or the just-passed minute.

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CLAIMS

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[Claim(s)]
[Claim 1] The minute hand moved at spacing shorter than 60 seconds by the 1st motor in
which a forward inversion is possible, It sets to an approach at the time of ** of the clock ›
which displays current time with the hour hand moved whenever predetermined step
movement of the above-mentioned minute hand is carried out by the 2nd motor in which a
forward inversion is possible. While the above-mentioned minute hand is directing locations
other than a forward part location at the time of actuation of the beginning of a switch at the
time of ** after switching to the mode by the mode circuit changing switch at the time of **
the time of ** of the clock characterized by moving the above-mentioned minute hand to one
of forward part locations approximately [ the ], and moving the above-mentioned minute hand
every [ 1 ] for every actuation of a switch at the time of ** after it —— an approach.
[Claim 2] The minute hand moved at spacing shorter than 60 seconds by the 1st motor in
which a forward inversion is possible, It sets to an approach at the time of ** of the clock
which displays current time with the hour hand moved whenever predetermined step
movement of the above-mentioned minute hand is carried out by the 2nd motor in which a
forward inversion is possible. Switch the mode and a lock mode at the time of a tone at the
mode and the time at the time of a part tone, and it sets [ above ] in the mode by the mode
circuit changing switch at the time of a tone at the time. When a **** switch is operated and
the above-mentioned minute hand shows locations other than a forward part, While moving
this minute hand to one of forward part locations approximately [ that ], the above-mentioned
hour hand is moved to the location according to the display position of the minute hand. At the
time of the above-mentioned tone after it by actuation of a switch Move the hand to the
location of the request according to the display position of the above-mentioned minute hand,
and the above-mentioned hour hand is set in the mode at the time of the above-mentioned

part tone. the time of ** of the clock characterized by moving the above-mentioned minute hand to one of forward part locations approximately [ the ], and moving the above-mentioned minute hand every [ 1 ] for every actuation of a switch at the time of ** after it while the above-mentioned minute hand is directing locations other than a forward part location at the time of actuation of the beginning of a **** switch -- an approach.

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[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to an approach at the time of ** of a clock.
[0002]
[Description of the Prior Art] Conventionally, there is a clock which is made to drive a hour hand and the minute hand separately, and displays time of day. Since such a clock can do a hour hand and the minute hand separately at the time of **, respectively, it has the effectiveness that the time of ** is easy and can shorten time amount at the time of **. At the time of concrete **, by specifying the mode with a mode switch at the time of **, the approach moved the minute hand to one of forward part locations before and behind the current display position so that it might be easy to act as a user at the time of **, it operated the switch at the time of an after that tone, and was correcting time of day.
[0003]
[Problem(s) to be Solved by the Invention] However, it had the trouble that a time stamp will be out of order even if he will notice this if a mode switch is switched to the mode at the time of ** accidentally [ since the minute hand moves the hand to a forward part location at the moment of switching the above-mentioned thing to the mode at the time of **, while displaying current time ], and it returns to the lock mode immediately.
[0004] The purpose of this invention is offering an approach at the time of ** of the clock which is made for a short time at the time of **, and time of day's moreover does not change by the operation mistake.
[0005]
[Means for Solving the Problem] The minute hand moved at spacing shorter than 60 seconds by the 1st motor which this invention can reverse [ forward ]. It sets to an approach at the time of ** of the clock which displays current time with the hour hand moved whenever predetermined step movement of the above-mentioned minute hand is carried out by the 2nd motor in which a forward inversion is possible. While the above-mentioned minute hand is

directing locations other than a forward part location at the time of actuation of the beginning of a switch at the time of ** after switching to the mode by the mode circuit changing switch at the time of ** the above-mentioned purpose is attained by moving the above-mentioned minute hand to one of forward part locations approximately [ the ], and moving the above-mentioned minute hand every [ 1 ] for every actuation of a switch at the time of ** after it.

[0006] Furthermore, by the mode circuit changing switch, switch the mode and a lock mode at the time of a tone at the mode and the time at the time of a part tone, and it sets [ above ] in the mode at the time of a tone at the time. When a **** switch is operated and the above-mentioned minute hand shows locations other than a forward part, While moving this minute hand to one of forward part locations approximately [ that ], the above-mentioned hour hand is moved to the location according to the display position of the minute hand. At the time of the above-mentioned tone after it by actuation of a switch Move the hand to the location of the request according to the display position of the above-mentioned minute hand, and the above-mentioned hour hand is set in the mode at the time of the above-mentioned part tone. while the above-mentioned minute hand is directing locations other than a forward part location at the time of actuation of the beginning of a **** switch, the above-mentioned purpose is attained by moving the above-mentioned minute hand to one of forward part locations approximately [ the ], and moving the above-mentioned minute hand every [ 1 ] for every actuation of a switch at the time of ** after it.

[0007]

[Example] Hereafter, this invention is concretely explained based on one example shown in the drawing.

[0008] In drawing 1 , 1 is a reference signal generating circuit, consists of a crystal oscillator, a counting-down circuit, etc., and generates a reference clock signal.

[0009] 2 is a clock circuit, consists of RAM etc. and clocks current time based on the reference clock signal which the reference signal generating circuit 1 outputs.

[0010] 3 is a control circuit, consists of CPU, ROM, RAM, an A/D-conversion circuit, etc., and controls various kinds of actuation.

[0011] 4 and 5 are the step motors in which a forward inversion is possible, and perform a forward inversion in response to the motor driving pulse which a control circuit 3 outputs. In addition, a step motor 5 constitutes the 1st motor and a step motor 4 constitutes the 2nd motor.

[0012] 6 and 7 are wheel trains and transmit rotation of step motors 4 and 5 to a hour hand 8 and the minute hand 9, respectively. In addition, by this example, current time and amenity are displayed using a hour hand 8 and the minute hand 9, humidity is displayed with a hour hand 8 and temperature is displayed by the minute hand 9, respectively.

[0013] 10 is a hour hand detector, consists of a photo interrupter etc. and detects the reflecting plate (not shown) formed on the rotor plate (not shown) which is interlocked with a hour hand 8 and rotates. In addition, in this example, when a hour hand 8 displays 0:00, the photo interrupter is formed in the location which can detect the reflecting plate. Therefore, the hour hand detector 10 generates a detection output, when a hour hand 8 displays 0:00.

[0014] 11 is a minute hand detector, consists of a photo interrupter etc. like the above, and detects the reflecting plate (not shown) formed on the rotor plate (not shown) which is interlocked with the minute hand 9 and rotates. In addition, in this example, when the minute hand 9 displays 0 minute, the photo interrupter is formed in the location which can detect the

reflecting plate. Therefore, the minute hand detector 11 generates a detection output, when the minute hand 9 displays 0 minute.

[0015] It consists of an updown counter, 12 is a hour hand location counter, in order for a control circuit 3 to move a hour hand 8, it counts the motor driving pulse outputted to a step motor 4, and it directs the display position of a hour hand 8. In addition, it is reset by the detection output which the hour hand detector 10 generates.

[0016] It consists of an updown counter like the above, 13 is a minute hand location counter, in order for a control circuit 3 to move the minute hand 9, it counts the motor driving pulse outputted to a step motor 5, and it directs the display position of the minute hand 9. In addition, it is reset by the detection output which the minute hand detector 11 generates.

[0017] 14 is the input section and consists of the rise key 142 and down key 143 grade which constitute a switch at the time of the mode circuit changing switch 141 which chooses "it is the mode at the time of time set −" (at the time [ At the time ] of a tone mode), the "time set-part mode" (at the time [ Minute ] of a tone mode), "lock-time-of-day mode", and "lock-temperature-and-humidity mode", and **. In addition, in this example, make "to be the mode at the time of time set −", and the "time set-part mode" into set mode (at the time of ** mode), and let "lock-time-of-day mode" and "lock-temperature-and-humidity mode" be lock modes. Moreover, when the mode circuit changing switch 141 switches, the mode changing signal of one pulse occurs.

[0018] 15 is a temperature sensor block, consists of a temperature sensor etc. and outputs the detection data according to surrounding temperature.

[0019] 16 is a humidity sensor block, consists of a humidity sensor etc. and outputs the detection data according to surrounding humidity.

[0020] 17 is a temperature data store circuit, consists of an A/D-conversion circuit, a ROM, etc., and has memorized the temperature data according to the detection data outputted from the temperature sensor block 15.

[0021] 18 is a humidity data store circuit, consists of an A/D-conversion circuit, a ROM, etc., and has memorized the humidity data according to the detection data outputted from the humidity sensor block 16.

[0022] 19 is a constant-voltage block and supplies a constant voltage to each circuit.

[0023] 20 is a monitor switch.

[0024] 21 is the time-of-day store circuit used in the case of a temporary display change, and consists of RAM etc.

[0025] 22 is a display and displays current time, temperature, humidity, and amenity alternatively by the hour hand 8 and the minute hand 9.

[0026] Next, actuation of a power up is explained.

[0027] If a power source is switched on, it will operate step motors 4 and 5 in the fixed direction until the hour hand detector 10 and the minute hand detector 11 generate a detection output, respectively (i.e., until a control circuit 3 displays 0:00 by the hour hand 8 and the minute hand 9).

[0028] If 0:00 is expressed as a hour hand 8 and the minute hand 9, the hour hand detector 10 and the minute hand detector 11 will generate a detection output, respectively, and will reset the hour hand location counter 12 and the part zero-bight-needle-location counter 13 to "0", respectively. That is, the directions output of the display position of a hour hand 8 and the hour hand location counter 12, and the display position of the minute hand 9 and the directions output of the minute hand location counter 13 are doubled. if a detection output occurs on the

other hand from the both sides of the hour hand detector 10 and the minute hand detector 11 — a control circuit 3 — the time check of the clock circuit 2 — time of day is reset to 0:00 and a time check is made to start therefore, the time check of the display time of day by the hour hand 8 and the minute hand 9, and the clock circuit 2 — time of day doubles. then, the control circuit 3 — the time check of the clock circuit 2 — according to time of day, a hour hand 8 and the minute hand 9 are moved. In addition, a hour hand 8 advances every 3 minutes for 3 minutes, and the minute hand 9 consists of these examples so that it may progress for 15 seconds every 15 seconds.

[0029] Next, actuation is explained with reference to <u>drawing 2</u> , and 3, 4 and 5.

[0030] A control circuit 3 will set (step 2a) and a measurement-request flag to "1" for every progress for 1 minute, if the value of the second of the clock circuit 2 is 0 second (step 2b). This is because temperature and the measure of humidity can be performed for every minute.

[0031] The value of the second of the clock circuit 2 in 0 second, 15 seconds, 30 seconds, and 45 seconds And the (step 2c), When current time is displayed and the movement flag is usually set to "1" (step 2d), Namely, when the modes are "it is the mode at the time of time set −", and the "time set-part mode" and the rise key 142 or the down key 143 is not operated, Or when set to "lock-time-of-day mode", a control circuit 3 outputs a motor driving pulse to a step motor 5, and moves the minute hand 9 by 15 second while it outputs a count-up assignment signal to the minute hand location counter 13 and changes it into a count-up condition (step 2e). At this time, a control circuit 3 counts the motor driving pulse outputted to a step motor 5, and makes the minute hand location counter 13 counted value +one (step 2f).

[0032] In addition, in this example, in case a control circuit 3 outputs the motor driving pulse which moves a hour hand 8 and the minute hand 9 in the direction of a clockwise rotation, a count-up assignment signal is outputted to the hour hand location counter 12 and the minute hand location counter 13, and in case the motor driving pulse which moves a hour hand 8 and the minute hand 9 in the direction of a counterclockwise rotation is outputted, a count-down assignment signal is outputted to the hour hand location counter 12 and the minute hand location counter 13.

[0033] Moreover, a movement flag is a flag for permitting movement which displays current time, and when a movement flag is usually "1", it usually performs movement which displays current time.

[0034] Next, a control circuit 3 outputs a motor driving pulse to a step motor 4, and moves a hour hand 8 only for 3 minutes while it outputs a count-up assignment signal to the hour hand location counter 12 and changes it into a count-up condition, whenever the value of the part of the clock circuit 2 clocks 3 minutes (step 2g) (step 2h). At this time, a control circuit 3 counts the motor driving pulse outputted to a step motor 4, and makes the hour hand location counter 12 counted value +one (step 2i).

[0035] The time check for these 3 minutes is performed as follows. The time-of-day data which added 3 minutes to the time-of-day data which the control circuit 3 read the time-of-day data of the clock circuit 2, and read are memorized to RAM in a control circuit 3. If it carries out by detecting coincidence with this time-of-day data and the time-of-day data clocked in the clock circuit 2 and coincidence is detected Every 3 minutes are clocked by reading time-of-day data from the clock circuit 2 like the above, adding 3 minutes to this, newly memorizing to RAM in a control circuit 3, and comparing with the time-of-day data of the clock circuit 2.

[0036] In addition, in step 2d, when the movement flag does not usually show current time by "0", the above-mentioned time-of-day movement is not performed. In this case, the time check of the clock circuit 2 is continued.

[0037] Then, a control circuit 3 judges whether the monitor switch 20 is turned on (step 2j), and if it is an ON state, it will perform drawing 5 and demonstration actuation (it is hereafter called demonstration actuation.) shown in 6.

[0038] If the monitor switch 20 is not operated and the mode switch 141 specifies set mode ("it being the mode at the time of time set -", or "time set-part mode") (step 2k), it will operate at the time of ** shown in drawing 3 .

[0039] If the monitor switch 20 is not operated and the mode switch 141 does not specify set mode (i.e., if the lock mode is specified) (steps 2j and 2k), actuation after A shown in drawing 4 will be performed.

[0040] Next, with reference to drawing 3 , actuation is explained at the time of **.

[0041] the time check by the clock circuit 2 if the rise key 142 or the down key 143 is operated (step 3a), while stopping movement which a control circuit 3 usually resets a movement flag, sets it to "0", and displays current time (step 3b) — actuation is suspended.

[0042] And when "it is the mode at the time of time set -" is set up with the mode switch 141 (step 3c), When the rise key 142 is operated and the down key 143 is operated in a count-up assignment signal, while a control circuit 3 outputs a count-down assignment signal to the hour hand location counter 12 and specifies a rise/down of a count When the rise key 142 is operated, only 1 hour is forward rotation (in this example, it considers as the direction of a clockwise rotation.) about a hour hand 8. When the motor driving pulse to carry out is outputted to a step motor 4 and the down key 143 is operated, the motor driving pulse to which inverse rotation (it considers as the direction of a counterclockwise rotation in this example.) of the hour hand 8 is carried out only for 1 hour is outputted to a step motor 4, and a hour hand 8 is moved for 1 hour (step 3d).

[0043] Since the hour hand location counter 12 counts the motor driving pulse inputted into a step motor 4 at this time, it comes to have the counted value according to the display time of day of a hour hand 8.

[0044] And a control circuit 3 makes the value at the time in the clock circuit 2 in agreement with the counted value of the hour hand location counter 12. Therefore, coincidence with the display time of day of a hour hand 8 and the value at the time in the clock circuit 2 can be taken.

[0045] If the display position of the minute hand 9 is not a forward part location at this time (step 3e), the minute hand 9 will be moved to hard flow with the usual movement to the nearest forward part location, and the digit of a second will be omitted (step 3f). This omits a second in order to carry out a zero second start. The time of day carried out at the time of ** becomes a part for forward by this, and the time of intelligible exact ** can be performed for a user.

[0046] And if the mode switch 141 is not changed into "lock-time-of-day mode" (step 3g), the same actuation as return and the above is performed to step 3a, for every actuation of the rise key 142 or the down key 143, the hand will be made to move by a unit of **1 hour, and a hour hand 8 will be set by the location at the time of a request.

[0047] In step 3c, if set as the "time set-part mode", when the rise key 142 is operated and the down key 143 is operated in a count-up assignment signal, a control circuit 3 will output a count-down assignment signal to the minute hand location counter 13 and the hour hand

location counter 12, and will specify a rise/down of a count. And when the motor driving pulse which carries out forward rotation of the minute hand 9 to the location for forward of a degree when the rise key 142 is operated is outputted to a step motor 5 and the down key 143 is operated, the motor driving pulse to which inverse rotation of the minute hand 9 is carried out to the last location for forward is outputted to a step motor 5, and the minute hand 9 is moved to a forward part location (step 3h).

[0048] Since the minute hand location counter 13 counts the motor driving pulse inputted into a step motor 5 at this time, it comes to have the counted value according to the display time of day of the minute hand 9.

[0049] And a control circuit 3 makes the value of the part in the clock circuit 2 in agreement with the counted value of the minute hand location counter 13. Therefore, coincidence with the display time of day of the minute hand 8 and the value of the part in the clock circuit 2 can be taken.

[0050] Furthermore, a control circuit 3 moves a hour hand 8 to the display position according to the display position of the minute hand 9.

[0051] Specifically according to the counted value of the minute hand location counter 13, a hour hand 8 is moved as mentioned above. Since this actuation is a well-known technique, it is not explained in full detail. Thereby, the display position of the minute hand 9 and a hour hand 8 can take adjustment, and coincidence of the value of the part in the clock circuit 2 and the value at the time can also take it (step 3i).

[0052] The time of ** is performed by repeating the above-mentioned steps 3a-3g.

[0053] After **** is completed, by setting a mode switch 141 as "lock-time-of-day mode", a control circuit 3 usually sets a movement flag to "1", permits movement of current time (step 3j), clears the value of the second of the clock circuit 2 at 0 second, makes the clock circuit 2 start a time check, and it moves from it to B of <u>drawing 2</u> (step 3k).

[0054] Therefore, if the mode is set as "lock-time-of-day mode", since the movement flag is usually set to "1", whenever the clock circuit 2 clocks for 15 seconds, the minute hand 9 is moved only for 15 seconds, and whenever it clocks for 3 minutes, a hour hand 8 moves the hand only for 3 minutes.

[0055] Next, the actuation after A of <u>drawing 2</u> is explained with reference to <u>drawing 4</u> .

[0056] First, actuation when the mode switches to "lock-time-of-day mode" is explained. In this case, 0:00 is once displayed and it switches to the display of current time.

[0057] If it explains concretely, since a mode changing signal will input from the input section 14 A control circuit 3 judges that the mode changed (step 4a), and sets a measurement-request flag to "1" (step 4b). Usually, a movement flag is reset, it is made "0", movement is usually forbidden (step 4c), and movement on which 0:00 is displayed by the hour hand 8 and the minute hand 9 is started (step 4d).

[0058] A motor driving pulse is outputted to step motors 4 and 5, the hand is moved, respectively (steps 4e and 4f), and, specifically, as for a hour hand 8, the minute hand 9 displays 0:00 until the minute hand detector 11 generates a detection output, until the hour hand detector 10 generates a detection output.

[0059] The hour hand location counter 12 is reset by the detection output which the hour hand detector 10 will generate by steps 4e and 4f if a hour hand 8 displays 0:00, and the display position of a hour hand 8 and the counted value of the hour hand location counter 12 double with it. And if the minute hand 9 displays 0 minute, the minute hand location counter 13 will be reset by the detection output which the minute hand detector 11 generates, and the

counted value of the minute hand 9 and the minute hand location counter 13 will double like the above with it (step 4g).

[0060] If 0:00 is expressed as a hour hand 8 and the minute hand 9 and the hour hand location counter 12 and the minute hand location counter 13 are reset Since the mode is "lock-time-of-day mode" (step 4h), reset a measurement-request flag and it is made "0" (step 4i). Usually, until it sets a movement flag to "1", it permits the usual time-of-day movement (step 4j) and the counted value of the value of the part of the clock circuit 2 and the time, the hour hand location counter 12, and the part zero-bight-needle-location counter 13 is in agreement like the above A motor driving pulse is outputted to a step motor 4 and a step motor 5, respectively, and a hour hand 8 and the minute hand 9 are moved. That is, current time is displayed by the hour hand 8 and the minute hand 9 (step 4k). Hereafter, it moves to B of drawing 2 and the same actuation as the above is performed.

[0061] When the mode is held at "lock-time-of-day mode", the minute hand 9 is moved every 15 seconds, and whenever 3 minutes pass, a hour hand 8 is moved.

[0062] Next, actuation when the mode switches to "lock-temperature-and-humidity mode" is explained.

[0063] In this case, once operating like the above and displaying 0:00 (step 4h), it switches to the display of temperature humidity.

[0064] And a movement flag is usually reset, it is made "0", and movement of a current time display is forbidden (step 4m).

[0065] Since the measurement-request flag is set to "1" by step 4b in now (step 4n), operate the temperature sensor block 15 and the humidity sensor block 16, the detection data according to temperature and humidity are made to output, respectively, and the temperature data and humidity data according to this detection data are made to input into a control circuit 3 from the temperature data store circuit 17 and the humidity data store circuit 18 (step 4p).

[0066] A control circuit 3 calculates and asks for the well-known discomfort index from the temperature data and humidity data which were inputted, and memorizes it to RAM in a control circuit 3 (step 4q).

[0067] Since temperature and humidity were measured, a measurement-request flag is reset, and it calculates and asks for the temperature data which input by making it "0" (step 4r), the display-position data (indicative data of humidity) of the hour hand 8 according to humidity data, and the display-position data (indicative data of temperature) of the minute hand 9, and memorizes to RAM in a control circuit 3.

[0068] Then, it judges whether it is in agreement with the display-position data (indicative data of humidity) of the hour hand 8 which the counted value of the hour hand location counter 12 memorized to RAM, and if not in agreement, while outputting a motor driving pulse to a step motor 4 and moving a hour hand 8, the counted value of the hour hand location counter 12 is changed. Hereafter, the counted value of the hour hand location counter 12 is compared with the display-position data (indicative data of humidity) of a hour hand 8 like the above.

[0069] If the counted value of the hour hand location counter 12 and the display-position data (indicative data of humidity) of a hour hand 8 are in agreement, it will judge that the control circuit 3 arrived at the display position corresponding to the humidity which the hour hand 8 measured, and the output of the motor driving pulse to a step motor 4 will be suspended.

[0070] Furthermore, synchronizing with movement of the above-mentioned hour hand 8, temperature is displayed by the minute hand 9. A motor driving pulse is outputted to a step

motor 5, and the display corresponding to the temperature which moved and measured the minute hand 9 is made to perform until the display-position data (indicative data of temperature) of the minute hand 9 and the counted value of the minute hand location counter 13 which were memorized to RAM in a control circuit 3 like the above are specifically in agreement (step 4s). Hereafter, it moves to B of drawing 2 and the same actuation as the above is performed. In addition, in this case, since a movement flag is usually "0", a hour hand 8 and the minute hand 9 do not perform movement of a current time display, but temperature and humidity are displayed.

[0071] Since a measurement-request flag is set whenever 1 minute passes when the mode is held at "lock-temperature-and-humidity mode", amenity is calculated while measuring and displaying temperature and humidity, whenever 1 minute passes.

[0072] Thus, since current time, and temperature and humidity are alternatively displayed with a common guide, components mark can be lessened and cost can be lowered.

[0073] Next, demonstration actuation is explained with reference to drawing 5 and 6.

[0074] If the monitor switch 20 is operated in this example in the case of "lock-time-of-day mode", i.e., when displaying current time, (refer to drawing 7 .) once -- 0:00 -- displaying -- the temperature between after that 10 seconds, and humidity -- displaying (refer to drawing 8 --) again -- 0:00 -- displaying -- a degree -- amenity -- for 7 seconds -- displaying (refer to drawing 9 --) after displaying 0:00 once again -- the display (refer to drawing 7 --) of current time if returning demonstration actuation is performed and the monitor switch 20 is operated in the case of "lock-temperature-and-humidity mode" -- the above -- the same -- once -- 0:00 -- displaying -- a degree -- amenity -- 7 seconds -- displaying (refer to drawing 9 --) After displaying 0:00 again, displaying current time for 10 seconds after that (refer to drawing 7 .) and displaying 0:00 once again, demonstration actuation which returns to the display (refer to drawing 8 .) of temperature and humidity shall be performed.

[0075] In addition, drawing 7 -9 are what showed the display mode of a display 22, and drawing 7 is drawing having shown the example as which drawing 8 displays temperature and humidity and drawing 9 displays amenity for current time.

[0076] If demonstration actuation is started, as for a control circuit 3, a mode switch 141 will judge whether it is a lock mode (step 5a), and if it is not a lock mode, it will move to actuation of B of drawing 2 . That is, demonstration actuation is not performed even if the monitor switch 20 is operated in set mode.

[0077] A movement flag is usually reset as it is a lock mode, it is made "0", movement is usually stopped (step 5b), 0:00 is displayed like the above, and the hour hand location counter 12 and the minute hand location counter 13 are reset (steps 5c, 5d, 5e, and 5f).

[0078] If 0:00 is expressed as a hour hand 8 and the minute hand 9 and the hour hand location counter 12 and the minute hand location counter 13 are reset A control circuit 3 operates the temperature sensor block 15 and the humidity sensor block 16 like the above. The detection data according to temperature and humidity are made to output, and the temperature data and humidity data according to this detection data input into a control circuit 3 from the temperature data store circuit 17 and the humidity data store circuit 18 (step 5g).

[0079] A control circuit 3 calculates and asks for the temperature data which memorize and (step 5h) input the amenity data which calculated and asked for amenity like the above from the temperature data to input and humidity data into RAM of them, the display-position data (indicative data of humidity) of the hour hand 8 according to humidity data, and the display-position data (indicative data of temperature) of the minute hand 9, and memorizes

them to RAM of them.

[0080] A display is switched as it is in "lock-time-of-day mode" here, humidity is displayed with a hour hand 8 and temperature is displayed by the minute hand 9 (steps 5j and 5k). (step 5i) In addition, the hour hand 8 in this case and movement of the minute hand 9 are performed until the counted value of the hour hand location counter 12 and the counted value of the minute hand location counter 13 are in agreement with the display-position data (indicative data of humidity) of a hour hand 8 and the display-position data (indicative data of temperature) of the minute hand 9 which were memorized to RAM in a control circuit 3 like the above.

[0081] If temperature and humidity are displayed by a hour hand 8 and the minute hand 9, a control circuit 3 will read the current time data which the clock circuit 2 has clocked, and will memorize the time-of-day data which added 10 seconds to the read time-of-day data to the time-of-day store circuit 21 (step 5m).

[0082] a control circuit 3 -- the time check of the clock circuit 2 -- if time of day is compared with the time of day memorized to the time-of-day store circuit 21 and coincidence is detected (step 5n) (i.e., if 10 seconds pass after the display of temperature and humidity is performed by a hour hand 8 and the minute hand 9), a control circuit 3 will display 0:00 by the hour hand 8 and the minute hand 9 like the above, and will reset the hour hand location counter 12 and the minute hand location counter 13. Thereby, the display position of a hour hand 8, the counted value of the hour hand location counter 12 and the display position of the minute hand 9, and the counted value of the minute hand location counter 13 double (steps 5p, 5q, 5r, and 5s). Hereafter, actuation after C of drawing 6 is performed. Therefore, the actuation after C is explained with reference to drawing 6 .

[0083] If 0:00 is displayed and the hour hand location counter 12 and the minute hand location counter 13 are reset, a control circuit 3 will output a motor driving pulse to step motors 4 and 5 so that a hour hand 8 and the minute hand 9 may lap and display the amenity data memorized to RAM of them (step 6a).

[0084] Thus, since a hour hand 8 and the minute hand 9 are displayed in piles when displaying the location of one place, a display condition can be checked correctly.

[0085] This movement is performed until the hour hand location counter 12 and the minute hand location counter 13 count the value according to amenity data.

[0086] If amenity is displayed (step 6b), a control circuit 3 will read the current time data which the clock circuit 2 has clocked like the above, and will memorize the time-of-day data which added 7 seconds to the read time-of-day data to the time-of-day store circuit 21 (step 6c). After carrying out clear [ of the time-of-day data which had memorized the time-of-day store circuit 21 before at this time ], the time-of-day data adding 7 seconds are memorized.

[0087] a control circuit 3 -- the time check of the clock circuit 2, if time of day is compared with the time of day memorized to the time-of-day store circuit 21 and coincidence is detected Namely, if 7 seconds pass after the display of amenity is performed by a hour hand 8 and the minute hand 9 (step 6d) After displaying 0:00 by the hour hand 8 and the minute hand 9 like the above (steps 6e, 6f, 6g, and 6h), While it outputs a motor driving pulse to a step motor 4 until the counted value of a control circuit 3 of the hour hand location counter 12 corresponds with the value at the time of the clock circuit 2 A motor driving pulse is outputted to a step motor 5 until the counted value of the minute hand location counter 13 is in agreement with the value of the part of the clock circuit 2 (step 6i).

[0088] If in agreement with the time of the counted value of the hour hand location counter 12

and the minute hand location counter 13 being the clock circuit 2, and the value of a part (step 6j), a control circuit 3 will judge that current time was displayed by a hour hand 8 and the minute hand 9, will usually set a movement flag to "1", will return to B of <u>drawing 2</u> , and will perform the same actuation as the above (step 6k).

[0089] In this case, the minute hand 9 is moved, and since a movement flag is usually set to "1", a hour hand 8 moves the hand every 3 minutes every 15 seconds.

[0090] Thus, since 0:00 are displayed and the counted value of the hour hand location counter 12 and the minute hand location counter 13 and the display position of a hour hand 8 and the minute hand 9 are doubled before returning to a current time display, current time can be displayed correctly.

[0091] It returns to <u>drawing 5</u> and it is made to display a hour hand 8 and the minute hand 9 like the above in piles that amenity is in "lock-temperature-and-humidity mode" (step 5t). (step 5i)

[0092] If the time-of-day store circuit 21 is made to memorize the time-of-day data which added 7 seconds to current time like the above when amenity was displayed (step 5u) (step 5v) and this time-of-day data and time-of-day data of the clock circuit 2 that were memorized are in agreement That is, 0:00 will be displayed, if 7 seconds pass after displaying amenity (step 5w) (step 5 x, 5y, 5z, 5alpha).

[0093] Hereafter, actuation after D of <u>drawing 6</u> is performed. Therefore, the actuation after D is explained with reference to <u>drawing 6</u> .

[0094] A control circuit 3 displays the current time which the clock circuit 2 has clocked like the above by the hour hand 8 and the minute hand 9 (step 6m). if a hour hand 8 and the minute hand 9 are moved to the display position of current time (step 6n) —— the above —— the same —— the time check of the clock circuit 2 —— data are read, 10 seconds is added to the read time-of-day data, and the time-of-day store circuit 21 is made to memorize (step 6p)

[0095] And if the time-of-day data memorized like the above in the time-of-day data and the time-of-day store circuit 21 of the clock circuit 2 are compared and coincidence is detected Namely, if 10 seconds pass after displaying current time (step 6q) If 0:00 is displayed again (steps 6r, 6s, 6t, and 6u), humidity is displayed with a hour hand 8, temperature is displayed by the minute hand 9 like the above (step 6v) and an exact display is performed (step 6w), the same actuation as return and the above will be performed to B of <u>drawing 2</u> . In this case, since a movement flag is usually "0", movement in every 3 minutes of a hour hand 8 does not perform movement in every 15 seconds of the minute hand 9, either, but temperature and humidity are displayed.

[0096] Since the display position of a hour hand 8 and the minute hand 9 and the counted value of the hour hand location counter 12 and the minute hand location counter 13 are doubled before performing the display of temperature and humidity also in this case, temperature and humidity can be displayed correctly.

[0097] Thus, since current time, temperature, humidity, and amenity are displayed by the hour hand 8 and the minute hand 9 and two or more displays in one display tooth space can be performed, a display tooth space can be made small and giving a limit to the magnitude of the whole clock is lost.

[0098] Moreover, since temperature is displayed for humidity on coincidence by the minute hand 9 with a hour hand 8, a user can recognize two different information at once.

[0099] Moreover, temperature, humidity, current time, and amenity can be checked, excelling in performance and enjoying movement for a user, since the information displayed by

operating a monitor switch now and different information are displayed between request time amount.

[0100] And since the actual display position of a hour hand 8 and the minute hand 9 and the counted value of the hour hand location counter 12 and the minute hand location counter 13 are made in agreement in case a display is switched, a hour hand 8 and the minute hand 9 can be moved to a desired display position by control of the counter value of each counter. Therefore, also when a display is switched, the misregistration by a pulse omission etc. can be prevented.

[0101] Moreover, since a hour hand 8 and the minute hand 9 are displayed in piles when displaying only amenity, it becomes easy to check the contents of a display.

[0102] Although the example which switches and displays current time, and temperature and humidity was shown above, the example which switches and displays current time, and a weather report and an atmospheric pressure next is explained.

[0103] In drawing 10 , 144 is a mode switch and chooses "it is the mode at the time of time set –", the "time set–part mode", "lock–time–of–day mode", and the "lock–weather mode." 23 is an atmospheric–pressure sensor. 24 is an atmospheric–pressure data store circuit, consists of an A/D–conversion circuit, a ROM, etc., and has memorized the atmospheric–pressure data according to the detection data outputted from the atmospheric–pressure sensor 23. 25 is a display and expresses current time, a weather report, and an atmospheric pressure as a hour hand 8 and the minute hand 9 alternatively. In addition, the thing of the same number as drawing 1 is taken as the same thing.

[0104] Next, actuation is explained with reference to drawing 11 . In addition, actuation is the same as that of the above–mentioned example at the time of actuation and ** of a power up.

[0105] After switching on a power source and performing the same actuation as the above, a control circuit 3 reads the current time data which the clock circuit 2 clocks, and memorizes the data which added 10 minutes to the read time–of–day data to RAM in a control circuit 3.

[0106] the time check of the clock circuit 2 –– if time–of–day data are in agreement with the time–of–day data memorized to RAM in a control circuit 3 (step 11a) (i.e., if 10 minutes pass), the atmospheric–pressure sensor 23 will be operated. The detection data according to an atmospheric pressure are outputted, atmospheric–pressure data are read from the atmospheric–pressure data store circuit 24 based on this detection data, and the atmospheric–pressure sensor 23 is inputted into a control circuit 3 (step 11b).

[0107] A control circuit 3 calculates and asks for weather report data (display–position data of the minute hand 9) from the atmospheric–pressure data to input, and memorizes them to RAM like the above while it calculates the display–position data (indicative data of an atmospheric pressure) of the hour hand 8 according to the atmospheric–pressure data to input and memorizes them to RAM of them (step 11c). In addition, weather report data forecast the weather for example, 8 hours after transition of the past atmospheric–pressure data.

[0108] In addition, if coincidence of time of day is detected, a control circuit 3 will read current time data from the clock circuit 2 like the above, and will newly memorize the time–of–day data which added 10 minutes to this to RAM in a control circuit 3. That is, whenever 10 minutes pass, a control circuit 3 detects coincidence of time–of–day data, and measures an atmospheric pressure.

[0109] When the movement flag is usually set to "1" like the above, the minute hand 9 is moved every 15 seconds, and a hour hand 8 is moved every 3 minutes.

[0110] Here, ON of the monitor switch 20 performs demonstration actuation shown in drawing

13 (step 11k).

[0111] If the monitor switch 20 is not operated and the mode switch 144 specifies set mode ("it being the mode at the time of time set –", or "time set–part mode") (step 11m), it will operate like the above at the time of ** shown in drawing 3 .

[0112] If the monitor switch 20 is not operated and the mode switch 144 does not specify set mode (i.e., if the lock mode is specified) (steps 11k and 11m), actuation after E shown in drawing 12 will be performed.

[0113] Next, the actuation after E of drawing 11 is explained with reference to drawing 12 .

[0114] The actuation at the time of being held at the actuation at the time of the mode switching to "lock–time–of–day mode" and "lock time–of–day mode" is the same as that of the above–mentioned example.

[0115] The actuation at the time of the mode switching to the "lock–weather mode" once displays 0:00, usually forbids movement like the above and displays a weather report and an atmospheric pressure by the hour hand (step 12j) 8 and the minute hand 9.

[0116] They move a hour hand 8, display an atmospheric pressure until the counted value of the concrete method of presentation [ a weather report and ] of an atmospheric pressure of the hour hand location counter 12 corresponds with the display–position data of the hour hand 8 memorized to RAM in a control circuit 3, move the minute hand 9 and display a weather report until the counted value of the minute hand location counter 13 is in agreement with the display–position data of the minute hand 9 memorized to RAM in a control circuit 3 at this actuation and coincidence.

[0117] When the mode is held at the "lock–weather mode", whenever 10 minutes pass, a weather report display and an atmospheric–pressure display update.

[0118] Next, demonstration actuation is explained with reference to drawing 13 .

[0119] In addition, if the monitor switch 20 is operated in this example in the case of "lock–time–of–day mode", i.e., when displaying current time, (refer to drawing 14 .) once –– 0:00 –– displaying –– the weather report between after that 10 seconds, and an atmospheric pressure –– displaying (refer to drawing 15 ––) again –– 0:00 –– displaying –– the display (refer to drawing 14 ––) of current time if returning demonstration actuation is performed and the monitor switch 20 is operated in the case of the "lock–weather mode" –– the above –– the same –– once –– 0:00 –– displaying –– after that –– current time –– for 10 seconds –– displaying (refer to drawing 14 ––) again –– 0:00 –– displaying –– the display (refer to drawing 15 ––) of a weather report and an atmospheric pressure Returning demonstration actuation shall be performed.

[0120] In addition, drawing 14 and 15 are what showed the display mode of a display 25, and it is drawing having shown the example as which drawing 14 displays current time and drawing 15 displays the atmospheric pressure and the weather report.

[0121] If it is in set mode when the monitor switch 20 is operated, will perform the same actuation as return and the above to F of drawing 11 , and a control circuit 3 makes it display by the hour hand 8 and the minute hand 9 that 0:00 is a lock mode, and the hour hand location counter 12 and the part zero–bight–needle–location counter 13 are reset (steps 13a, 13b, 13c, 13d, 13e, and 13f).

[0122] An atmospheric pressure is displayed with a hour hand 8, and it is displayed by the minute hand 9 that a weather report is in "lock–time–of–day mode" here (steps 13h and 13i). (step 13g) In addition, the hour hand 8 in this case and movement of the minute hand 9 are the same as that of the above.

[0123] If 10 seconds pass after an atmospheric pressure and a weather report are displayed by a hour hand 8 and the minute hand 9 (step 13k), a hour hand 8 and the minute hand 9 will be again moved to 0:00 (steps 13m, 13n, and 13p), and if movement is completed (steps 13q and 13r), it will return to the display of current time (steps 13s and 13t).

[0124] After displaying current time for 10 seconds by the hour hand 8 and the minute hand 9 after displaying that 0:00 is in "lock-weather mode", and displaying 0:00 after that, it returns to the display of an atmospheric pressure and a weather report (steps 13u, 13v, 13w, 13x, 13y, 13z, 13alpha, 13beta, 13gamma, and 13delta).

[0125] Thus, since current time, a weather report, and an atmospheric pressure are displayed by the hour hand 8 and the minute hand 9 and two or more displays in one display tooth space can be performed, a display tooth space can be made small and giving a limit to the magnitude of the whole clock is lost.

[0126] Moreover, since a weather report is displayed for an atmospheric pressure on coincidence by the minute hand 9 with a hour hand 8, a user can recognize two different information at once.

[0127] Moreover, an atmospheric pressure, current time, and a weather report can be checked, excelling in performance and enjoying movement for a user, since the information displayed by operating a monitor switch now and different information are displayed between request time amount.

[0128] And since the actual display position of a hour hand 8 and the minute hand 9 and the counted value of the hour hand location counter 12 and the minute hand location counter 13 are made in agreement like the above-mentioned example in case a display is switched, a hour hand 8 and the minute hand 9 can be moved to a desired display position by control of the counter value of each counter. Therefore, also when a display is switched, the misregistration by a pulse omission etc. can be prevented.

[0129]

[Effect of the Invention] Since the location of a guide does not move only by having switched to the mode at the time of ** according to this invention, even if it operates a mode circuit changing switch accidentally and switches to the mode at the time of **, if it returns to a lock mode, current time can be displayed correctly. And since the minute hand moves the hand to a forward part location when a switch is operated in the mode at the time of ** at the time of **, a user can do in the forward part location which is easy to carry out at the time of ** at the time of **.

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[Translation done.]

# DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block circuit diagram having shown one example of this invention.
[Drawing 2] The flow chart for explanation of drawing 1 of operation.
[Drawing 3] The flow chart for explanation of drawing 1 of operation.
[Drawing 4] The flow chart for explanation of drawing 1 of operation.
[Drawing 5] The flow chart for explanation of drawing 1 of operation.
[Drawing 6] The flow chart for explanation of drawing 1 of operation.
[Drawing 7] The explanatory view having shown the 1 display mode of the display of drawing 1 .
[Drawing 8] The explanatory view having shown other display modes of the display of drawing 1 .
[Drawing 9] The explanatory view having shown other display modes of the display of drawing 1 .
[Drawing 10] The block circuit diagram having shown other examples of this invention.
[Drawing 11] The flow chart for explanation of drawing 10 of operation.
[Drawing 12] The flow chart for explanation of drawing 10 of operation.
[Drawing 13] The flow chart for explanation of drawing 10 of operation.
[Drawing 14] The explanatory view having shown the 1 display mode of the display of drawing 10 .
[Drawing 15] The explanatory view having shown other display modes of the display of drawing 10 .
[Description of Notations]
4 2nd Motor
5 1st Motor
8 Hour Hand
9 Minute Hand
141 Mode Circuit Changing Switch
144 Mode Circuit Changing Switch
142 It is Switch at the Time of **.

[Translation done.]